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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/697,589   | 10/30/2003  | Yong Chen            | 10992517-3          | 8317             |
| 7590   | 01/31/2006  |                      | EXAMINER            |                  |
| HEWLETT-PACKARD COMPANY<br>Intellectual Property Administration<br>P. O. Box 272400<br>Fort Collins, CO 80527-2400 |             |                      | WEISS, HOWARD       |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2814                |                  |

DATE MAILED: 01/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

BV

|                              |                          |                     |  |
|------------------------------|--------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b>   | <b>Applicant(s)</b> |  |
|                              | 10/697,589               | CHEN ET AL.         |  |
|                              | Examiner<br>Howard Weiss | Art Unit<br>2814    |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 19 December 2005.  
 2a) This action is **FINAL**.                  2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 12-29 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) 18-29 is/are allowed.  
 6) Claim(s) 12-17 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
     Paper No(s)/Mail Date \_\_\_\_\_.  
 4) Interview Summary (PTO-413)  
     Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) Notice of Informal Patent Application (PTO-152)  
 6) Other: \_\_\_\_\_.

Attorney's Docket Number: 10992517-3

Filing Date: 10/30/03

Continuing Data: Division of 10/104,348 (3/22/02 now U.S. Patent No. 6,699,779); RCE  
established 7/18/05

Claimed Foreign Priority Date: none

Applicant(s): Chen et al. (Williams)

Examiner: Howard Weiss

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent; except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 12 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Watanabe et al. (U.S. Patent No. 6,590,231).

Watanabe et al. show all aspects of the instant invention (e.g. Figure 3) including:

- a first elongated nanowire on and in contact with an insulating surface **12** and having two ends **16,16'** forming source/drain of a transistor and being first non-curved portions
- a second elongated nanowire **19** having second non-curved portions (that portion of **19** between wire **18** and the bend in **19**) at right angles to and in the same plane as said first nanowire
- a gap about between 0.4 and 10 nm between said first and second nanowires (Column 8 Lines 55 to 59)

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. and Hofmann et al. (U.S. Patent No. 6,707,098).

Watanabe et al. shows most aspects of the instant invention (Paragraph 2) except for the gap filled with electrical charge storing material. Hofmann et al. teach (e.g. Figure 1) to fill a gap between nanowires 101,107 with charge storing material 103 to form a binary permanent memory system (Column 5 Lines 26 to 38). It would have been obvious to a person of ordinary skill in the art at the time of invention to fill a gap between nanowires with charge storing material as taught by Hofmann et al. in the device of Watanabe et al. to form a binary permanent memory system.

5. Claims 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. and Jin (U.S. Patent No. 6,286,226).

Watanabe et al. disclose most aspects of the claimed invention (Paragraph 2) except for the use of Carbon nanotubes for the nanowire material instead of semiconductor material chosen from the group as claimed. Jin teaches (Column 6 Lines 16 to 22) that semiconductor material is an equivalent nanowire material known in the art. Therefore, because these two nanowire materials were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute a semiconductor material for the carbon nanotubes.

6. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. and Yano et al. (JP 04-097564).

Watanabe et al. disclose most aspects of the claimed invention (Paragraph 2) except for the gap filled with material having an electric dipole moment and the first and second nanowires forming a two-electrode memory switching device. Yano et al. teach (e.g. Figure 17) to fill a gap with material **52** having an electric dipole moment and the first **58** and second **57** nanowires forming a two-electrode memory switching device to permit high-speed information processing by extremely small electric consumption (see PURPOSE). It would have been obvious to a person of ordinary skill in the art at the time of invention to fill a gap with material having an electric dipole moment and the first and second nanowires forming a two-electrode memory switching device as taught by Yano et al. in the device of Watanabe et al. to permit high-speed information processing by extremely small electric consumption.

***Allowable Subject Matter***

7. Claims 18 to 29 are allowed.
8. The following is a statement of reasons for the indication of allowable subject matter: an electronic device as claimed including first and second straight portions of respective nanowire structures forming a T-shaped structure and separated by a gap

between 0.4 to 10 nm could not be anticipated nor, in combination, be rendered obvious over the prior art of record.

***Response to Arguments***

9. Applicant's arguments filed 12/19/05 have been fully considered but they are not persuasive. As stated in the rejection above (Paragraph 2), Watanabe et al. do show a non-curved portion of a first wire perpendicular to a non-curved portion of a second nanowire. In view of these reasons and those set forth in the present office action, the rejections of the stated claims stand.

***Conclusion***

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).

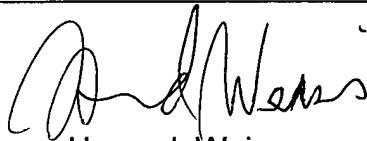
12. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via [Howard.Weiss@uspto.gov](mailto:Howard.Weiss@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on **(571) 272-1705**.

14. The following list is the Examiner's field of search for the present Office Action:

| Field of Search                          | Date         |
|--|--------------|
| U.S. Class / Subclass(es): 257/ 295, 310 | thru 1/30/06 |
| Other Documentation: none                |              |
| Electronic Database(s): EAST             | thru 1/30/06 |

HW/hw  
30 January 2006



Howard Weiss  
Primary Examiner  
Art Unit 2814